

## South Carolina Energy Code

The Energy Code is located in the SC Code of Laws: Title 6, Chapter 9, Building Code 6-9-50, energy codes [http://www.scstatehouse.net/sess115\\_2003-2004/bills/449.htm](http://www.scstatehouse.net/sess115_2003-2004/bills/449.htm) SECTION 6-9-50. Covering 98% of South Carolina or Chapter 10, Building Energy Efficiency Standard Act (for jurisdictions that have not adopted the Building Code, Union County) <http://www.lpitr.state.sc.us/code/t06c010.htm>.

The energy code offers **three compliance** paths for residential buildings.

### Option 1:

The Residential Building Envelope Requirements are considered in compliance if:

- R-30 insulation in the ceiling and R-19 for ceiling/roof combinations
- R-13 for exterior walls
- R-19 for floors with crawl space
- R-6, or installed equivalent for ductwork located in an unconditioned space
- Double pane or single pane with storm windows are used for window glass

All other requirements of the International Energy Conservation Code listed must be met, for Air Leakage,

Duct Construction, Temperature Controls, HVAC Piping Insulation, Swimming Pools, Service Water Heating, Electric.

### Or Option 2

Including but not limited to, computer models of the energy code developed by Pacific Northwest National Laboratories (the REScheck/IECC2000 material) for South Carolina's climatic zones. For free software downloads for REScheck, REScheck for Mac, go to

<http://www.energycodes.gov/index.stm>, and on the next three pages shows the three zone requirements.

### Or Option 3

The International Energy Conservation Code (IECC 2000), by complying with either:

- Chapter 4, Residential Buildings Design By Systems Analysis and Design of Building Utilizing Renewable Energy Sources
- Chapter 5, Residential Building Design by Component Performance Approach or
- Chapter 6, Simplified Prescriptive Requirements for Residential Buildings Type A-1 and A-2.

For a summary of the SC Energy Code go to [http://www.energy.sc.gov/Residential/residential\\_index.htm](http://www.energy.sc.gov/Residential/residential_index.htm) and click on Residential Energy Code

You may purchase a copy of the IECC from Mr. Vaughn Wicker, International Code Council, 1200 Woodruff Road, Suite G26, Greenville, SC 29607, 1-800-597-2224,

[vwicker@iccsafe.org](mailto:vwicker@iccsafe.org). Or by going to [www.ecodes.biz](http://www.ecodes.biz) or <http://www.iccsafe.org/e/category.html>.



**FIGURE 302.1(41)**  
**SOUTH CAROLINA**

If the envelope design criteria is going to be different from **Option 1**. Then the following compliance path could be taken based on the zone in which your county is in:

**Table 502.2.4 (1 through 9) Based on the Window Area versus the Percent of Gross Wall Area.**

**Zone 7A (HDD range is 3000-3499)**

Abbeville	Anderson	Cherokee	Chester	Chesterfield	Fairfield
Greenville	Greenwood	Kershaw	Lancaster	Laurens	Oconee
Pickens	Spartanburg	Union	York		

7A							
	Maximum			Minimum			
Window Area as a percent of Gross Wall Area	Glazing U-Factor	Ceiling R-value	Exterior Wall R-value	Floor R-value	Basement wall R-value	Crawlspace wall R-value	Building Type
8%	0.70	R-26	R-11	R-13	R-5	R-6	A-1
12%	0.60	R-30	R-13	R-15	R-6	R-6	A-1
15%	0.55	R-30	R-13	R-19	R-7	R-8	A-1
18%	0.50	R-38	R-13	R-19	R-7	R-8	A-1
20%	0.46	R-38	R-13	R-19	R-7	R-9	A-1
25%	0.45	R-38	R-19	R-19	R-7	R-9	A-1
20%	0.55	R-30	R-13	R-11	R-5	R-5	A-2
25%	0.55	R-30	R-13	R-11	R-5	R-5	A-2
30%	0.47	R-38	R-13	R-19	R-7	R-9	A-2

slab R-4

**Zone 6B (HDD range is 2500-2999)**

Aiken (H), Calhoun (H), Clarendon (H), Darlington (H), Dillon (H), Edgefield (H), Florence (H), Lee (H), Lexington (H), Marion (H), Marlboro (H), McCormick (H), Newberry (H), Orangeburg (H), Richland (H), Saluda (H), Sumter (H), Williamsburg (H).

6B							
	Maximum			Minimum			
Window Area as a percent of Gross Wall Area	Glazing U-Factor	Ceiling R-value	Exterior Wall R-value	Floor R-value	Basement wall R-value	Crawlspace wall R-value	Building Type
8%	0.70	R-26	R-11	R-11	R-5	R-6	A-1
12%	0.60	R-26	R-13	R-13	R-5	R-5	A-1
15%	0.60	R-30	R-13	R-19	R-6	R-7	A-1
18%	0.52	R-30	R-13	R-19	R-6	R-7	A-1
20%	0.50	R-38	R-13	R-19	R-6	R-7	A-1
25%	0.46	R-38	R-16	R-19	R-6	R-7	A-1
20%	0.55	R-30	R-13	R-11	R-5	R-5	A-2
25%	0.55	R-30	R-13	R-11	R-5	R-5	A-2
30%	0.47	R-38	R-13	R-19	R-7	R-8	A-2

slab R-4

**Zone 5A (HDD range is 3000-3499)**

Allendale (H), Bamberg (H), Barnwell (H), Beaufort (H), Berkeley (H), Charleston (H), Colleton (H), Dorchester (H), Georgetown (H), Hampton (H), Horry (H), Jasper (H).

5A	Maximum			Minimum			
Window Area as a percent of Gross Wall Area	Glazing U-Factor	Ceiling R-value	Exterior Wall R-value	Floor R-value	Basement wall R-value	Crawlspace wall R-value	Building Type
8%	0.90	R-19	R-11	R-11	R-5	R-6	A-1
12%	0.65	R-19	R-13	R-11	R-5	R-5	A-1
15%	0.65	R-30	R-13	R-11	R-5	R-6	A-1
18%	0.55	R-30	R-13	R-11	R-5	R-6	A-1
20%	0.52	R-38	R-13	R-11	R-5	R-6	A-1
25%	0.50	R-38	R-13	R-19	R-8	R-10	A-1
20%	0.70	R-19	R-11	R-11	R-5	R-5	A-2
25%	0.70	R-19	R-11	R-11	R-5	R-5	A-2
30%	0.57	R-38	R-13	R-11	R-5	R-6	A-2

- Counties identified with (H) shall be considered ‘hot and humid climate areas’ and do not require a vapor barrier.
- All counties are considered to be in Very Heavy Termite Infestation Counties, perimeter slab insulation is not required. In Zones 6B and 7A where the window floor ratio is 15% shows R-4 perimeter slab insulation is required, however, the slab insulation is not required if additional insulation is added or a more efficient glazing is used.
- For more complex designs go to Chapter 5 of the IECC 2000.

**Percentage Window Area:** Estimate percent window in the wall by dividing the total rough opening of the window area by the gross wall area. The window percentage is a ratio of the glazing assemblies – including sliding glass doors and basement windows but excluding opaque doors – to the gross wall area.

**National Minimums for Equipment Performance:**

Heating: air-to-air heat pumps <65,000 BTU/h single package 6.6 HSPF, split systems 6.8 HSPF  
 Gas or oil fired furnaces, <225,000 BTU/h AFUE 78%  
 Air-cooled a/c and heat pumps <65,000 BTU/h split system 10 SEER, single package 9.7 SEER

**Air Leakage:** All penetrations to the envelope must be sealed and caulked, gasketed, and weatherstripped. Including but not limited to, areas around windows, doors, HVAC ductwork, plumbing and electrical penetrations.

All other requirements of the IECC 2000 must be met: including, Air Leakage, Duct Construction, Temperature Controls, HVAC Piping Insulation, Swimming Pools, Service Water Heating, Electric. For a copy of the Summary of Basic Requirements, is located at the end of this document.

**Important Facts:**

**HVAC Equipment:** The International Residential Code 2000, states that equipment shall be sized based on the building loads determined by using ACCA Manual J or other approved calculation methodologies. You can request from you HVAC company a Manual J load calculation to verify that the system has been properly sized.

**Duct Construction:** The International Residential Code 2000, states that ducts shall be fabricated in accordance with the provisions of Chapter 16 and ACCA Manual D or other approved methods.

All joints and seams, and connections must be securely fastened and sealed with approved tapes and mastics. “Duct (duck) tape” is not permitted as a sealant on any ducts.

## Summary of Basic Requirements

<b>Air Leakage</b>	<ul style="list-style-type: none"> <li>§ Joints, penetrations, and all other such openings in the building envelope that are sources of air leakage must be caulked, gasketed, weatherstripped, or otherwise sealed.</li> <li>§ Recessed lights must be type IC rated and installed with no penetrations or installed inside an appropriate air-tight assembly with a 0.5-in. clearance from combustible materials and 3-in. clearance from insulation.</li> </ul>
<b>Vapor Retarder</b>	Vapor retarders must be installed on the warm-in-winter side of all non-vented framed ceilings, walls, and floors, except in exempted locations.
<b>SHGC</b>	In zones 1-7, the area-weighted average SHGC of all glazing cannot exceed 0.4.
<b>Materials and Insulation Information</b>	<ul style="list-style-type: none"> <li>§ Materials and equipment must be installed in accordance with the manufacturer=s installation instructions.</li> <li>§ Materials and equipment must be identified so that compliance can be determined.</li> <li>§ Manufacturer manuals for all installed heating and cooling equipment and service water heating equipment must be provided.</li> <li>§ Insulation R-values, glazing and door U-factors and SHGC values (in zones 1-7), and heating and cooling equipment efficiency (if high-efficiency credit is taken) must be clearly marked on the building plans or specifications.</li> <li>§ Exterior foundation wall and slab perimeter insulation must have a rigid, opaque, and weather-resistant covering that prevents degradation of the insulation=s performance, covers the exposed (above-grade) area of the insulation, and extends to a minimum of 6 in. (153 mm) below grade.</li> </ul>
<b>Duct Insulation</b>	<p>Supply and return-air ducts and plenums for heating and cooling systems located in unconditioned spaces must be insulated to the levels shown on the reverse side of this sheet.</p> <p><i>Exception:</i> Factory-installed plenums, casings, or ductwork furnished as part of the HVAC equipment.</p>
<b>Duct Construction</b>	<ul style="list-style-type: none"> <li>§ All joints, seams, and connections must be securely fastened with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric, or tapes. <u>Duct tape is not permitted.</u></li> <li><i>Exception:</i> Continuously welded and locking-type longitudinal joints and seams on ducts operating at less than 2 in. w.g. (500 Pa).</li> <li>§ Ducts must be supported every 10 feet or in accordance with the manufacturer=s instructions.</li> <li>§ Cooling ducts with exterior insulation must be covered with a vapor retarder.</li> <li>§ Air filters are required in the return air system.</li> <li>§ The HVAC system must provide a means for balancing air and water systems.</li> </ul>
<b>Temperature Controls</b>	<ul style="list-style-type: none"> <li>§ Thermostats are required for each separate HVAC system in single-family buildings and each dwelling unit in multifamily buildings (non-dwelling portions require one thermostat for each system or zone). Thermostats must have the following ranges: <ul style="list-style-type: none"> <li>Heating Only                                55EF - 75EF</li> <li>Cooling Only                                70EF - 85EF</li> <li>Heating and Cooling                        55EF - 85EF</li> </ul> </li> <li>§ A means to partially restrict or shut off the heating and/or cooling input to each zone or floor must be provided for single-family homes and to each room for multifamily buildings.</li> <li>§ Heat pumps require a thermostat that can prevent the back-up heat from turning on when the heating requirements can be met by the heat pump alone.</li> </ul>
<b>HVAC Piping Insulation</b>	HVAC piping in unconditioned spaces conveying fluids above 105EF or chilled fluids at less than 55EF must be insulated to the levels shown on the reverse side of this sheet.
<b>Swimming Pools</b>	<ul style="list-style-type: none"> <li>§ All heated swimming pools must have an on/off pool heater switch.</li> <li>§ Heated pools require a pool cover unless over 20% of the heating energy is from non-depletable sources.</li> <li>§ All swimming pool pumps must be equipped with a time clock.</li> </ul>
<b>Service Water Heating</b>	<ul style="list-style-type: none"> <li>§ Water heaters with vertical pipe risers must have a heat trap on both the inlet and outlet unless the water heater has an integral heat trap or is part of a circulating system.</li> <li>§ Circulating hot water systems must have automatic or manual controls and pipes must be insulated to the levels shown on the reverse side of this sheet.</li> </ul>
<b>Electric</b>	Each multifamily dwelling unit must be equipped with separate electric meters.

Version 3.0/April 2000/U.S. Dept. of Housing and Urban Development / Rural Economic and Community Development/U.S. Dept. of Energy/Pacific Northwest National Laboratory

### Duct Insulation R-Value Requirements

Zone Number	Ducts in Unconditioned Spaces (i.e. Attics, Crawl Spaces, Unheated Basements and Garages, and Exterior Cavities)	Ducts Outside the Building
Zones 1-4	R-5	R-8
Zones 5-14	R-5	R-6.5
Zone 15-19	R-5	R-8

### Minimum HVAC Piping Insulation Thickness<sup>(a)</sup>

Piping System Types	Fluid Temp Range (EF)	Insulation Thickness in Inches by Pipe Sizes <sup>(b)</sup>			
		Runouts 2 in. <sup>(c)</sup>	1 in. and Less	1.25 in. to 2 in.	2.5 in. to 4 in.
Heating Systems					
Low Pressure/Temperature	201-250	1.0	1.5	1.5	2.0
Low Temperature	120-200	0.5	1.0	1.0	1.5
Steam Condensate (for feed water)	Any	1.0	1.0	1.5	2.0
Cooling Systems					
Chilled Water, Refrigerant, and Brine	40-55	0.5	0.5	0.75	1.0
	Below 40	1.0	1.0	1.5	1.5
(a) The pipe insulation thicknesses specified in this table are based on insulation R-values ranging from R-4 to R-4.6 per inch of thickness. For materials with an R-value greater than R-4.6, the insulation thickness specified in this table may be reduced as follows:					
$\text{New Minimum Thickness} = \frac{4.6 \times \text{Table 2 - 2 Thickness}}{\text{Actual R - Value}}$					
For materials with an R-value less than R-4, the minimum insulation thickness must be increased as follows:					
$\text{New Minimum Thickness} = \frac{4.0 \times \text{Table 2 - 2 Thickness}}{\text{Actual R - Value}}$					
(b) For piping exposed to outdoor air, increase thickness by 0.5 in.					
(c) Applies to runouts not exceeding 12 ft in length to individual terminal units.					

### Minimum Insulation Thickness for Recirculation Piping

Heated Water Temperature (EF)	Insulation Thickness in Inches by Pipe Sizes <sup>(a)</sup>			
	Non-Circulating Runouts	Circulating Mains and Runouts		
	Up to 1 in.	Up to 1.25 in.	1.5 - 2.0 in.	Over 2 in.
170-180	0.5	1.0	1.5	2.0
140-160	0.5	0.5	1.0	1.5
100-130	0.5	0.5	0.5	1.0
(a) Nominal pipe size and insulation thickness.				



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